CLAIMS:

1. A microscope arrangement for imaging a sample (20) that contains a magnetically and/or electrically sensitive fluorescent marker (21), comprising

- a fluorescence microscope (10) for exciting and imaging fluorescence radiation (ν_F) from the sample (20);
- a field generator (30) for generating an inhomogeneous magnetic and/or inhomogeneous electric field (33) in the sample (20).

2. A microscope arrangement as claimed in claim 1, which is designed to alter the inhomogeneous field (33) within the sample (20) in a defined manner.

3. A microscope arrangement as claimed in claim 1, characterized in that the field generator (30) for generating an inhomogeneous field (33) has a first pole body (31) of a first polarity (N), which on at least two opposite sides is adjacent to second pole bodies (32) of different polarity (S).

4. A microscope arrangement as claimed in claim 1, characterized in that it comprises a data processing device for image processing of the image (I_{FM}) recorded by the fluorescence microscope (10), the data processing device being designed to reconstruct the distribution of the fluorescent marker (21) in the sample (20) from the known spatial strength distribution of the inhomogeneous field (33) during one or preferably several recordings.

5. A method of determining the spatial distribution of a magnetically and/or electrically sensitive fluorescent marker (21) in a sample (20), which method comprises the following steps:

- generation of an inhomogeneous magnetic and/or inhomogeneous electric field (33) in the sample (20);
- excitation of fluorescence radiation (ν_F) in the sample (20);

- generation by means of a fluorescence microscope (10) of an image (I_{FM}) of the fluorescence radiation (ν_F) coming from the sample (20);
- calculation of the spatial distribution of the fluorescent marker (21) by means of the generated image (I_{FM}) and by means of the known strength distribution of the field (33).

6. A method as claimed in claim 5, characterized in that the inhomogeneous magnetic field (33) has a gradient of at least 10^2 T/m, preferably of at least 10^6 T/m.

7. A method as claimed in claim 5, characterized in that the inhomogeneous electric field has a gradient of at least 10^{11} V/m^2, preferably of at least 10^{15} V/m^2.

8. A method as claimed in claim 5, characterized in that the inhomogeneous field (33) has a local minimum (22) of field strength, especially a field-free point or region.

9. A method as claimed in claim 8, characterized in that the width of the local minimum (22) is smaller than the optical resolution of the fluorescence microscope (10).

10. A method as claimed in claim 5, characterized in that the sample (20) is located in a solution with the fluorescent marker.